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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. **AUTP03/9914-2**
First Inventor or Application Identifier **FARLOW**
Title **COMPARISON TABLE GENERATION...**
Express Mail Label No. **EJ778559587US**

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ * Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Specification [Total Pages **33**]
(preferred arrangement set forth below)
 - Descriptive title of the Invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to Microfiche Appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
3. **5** Drawing(s) (35 U.S.C. 113) [Total Sheets **5**]
4. Oath or Declaration [Total Pages **1**]
 - a. ☒ Newly executed (original or copy)
 - b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))
(for continuation/divisional with Box 16 completed)
 - i. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

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ADDRESS TO: Assistant Commissioner for Patents
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5. ☐ Microfiche Computer Program (Appendix)
6. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
 - a. ☐ Computer Readable Copy
 - b. ☐ Paper Copy (identical to computer copy)
 - c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

7. ☒ Assignment Papers (cover sheet & document(s))
8. ☐ 37 C.F.R. § 3.73(b) Statement of Power of Attorney (when there is an assignee)
9. ☐ English Translation Document (if applicable)
10. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
11. ☐ Preliminary Amendment
12. ☒ Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
13. ☒ * Small Entity Statement(s) ☐ Statement filed in prior application, Status still proper and desired (PTO/SB/09-12)
14. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)
15. ☐ Other: _____

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☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No. _____ / _____

Prior application information: Examiner _____

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STATEMENT CLAIMING SMALL ENTITY STATUS

(37 CFR 1.9(f) & 1.27(c))--SMALL BUSINESS CONCERN

Docket Number (Optional)

AUTP03/9914-2

Applicant, Patentee, or Identifier: Timothy S. Farlow

Application or Patent No.: _____

Filed or Issued: 31 January 2000 11 February 2000

Title: Comparison Table Generation and Display from Instantiations
of Knowledge Model

I hereby state that I am

☐ the owner of the small business concern identified below:

☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF SMALL BUSINESS CONCERN Authoria, Inc.

ADDRESS OF SMALL BUSINESS CONCERN 78 Fourth Avenue

Waltham, MA 02451-7507

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☐ the application identified above.

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If the rights held by the above identified small business concern are not exclusive, each individual, concern, or organization having rights in the invention must file separate statements as to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

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NAME OF PERSON SIGNING William Brown

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SIGNATURE William Brown

DATE 2/2/00

COMPARISON TABLE GENERATION AND DISPLAY FROM INSTANTIATIONS OF KNOWLEDGE MODEL

The present invention relates to a knowledge-based, comparative information dissemination system having an architecture that separates the presentation of information from its organization in the system to enable a user to dynamically alter both the information retrieved and the format in which the retrieved information is displayed.

BACKGROUND OF THE INVENTION

It is common for companies to offer more than one benefit plan to their employees. *E.g.*, a company might offer different medical plans having different features and costs and different retirement savings plans having different payroll deduction options. Although determining which plan best suits an individual employee's needs can be a very complicated decision, new employees are typically asked to enroll in a medical plan and a retirement plan on the day that they begin their employment with the company.

Further, although companies typically provide written materials describing the various plans, the benefits offered under the plans, and their respective costs, these are usually very complex legal documents that are drafted with an eye toward satisfying the vendor's full disclosure requirements, not toward educating the customer.

Unfortunately, most companies merely distribute these printed materials provided by the vendors and make no provisions for an employee to make a simple comparative analysis of the available options. Thus, even if the employee is permitted a few days before being required to make an enrollment decision, in many cases the decision is still made without the employee understanding the differences between the offered plans or the impact that selecting one plan over another will have, given the employee's

particular needs and circumstances. Furthermore, if the new employee later decides that the selected plans and/or benefits do not best suit his needs, any subsequent changes may only be made during the annual enrollment period open to all employees. This could require an employee to wait up to a year to correct a poor decision made
5 either in haste or with insufficient information.

Regrettably, specific comparative information often is difficult to compile, even for trained benefits administrators, and requires significant extra work on the part of the domain experts to compile. In addition, even compiled information usually is difficult to understand for the employee who is generally unfamiliar with the employee
10 benefits knowledge domain. Moreover, if such collected comparative information is maintained by the domain experts, it must be updated continuously as costs and features of the various plans change.

An increasingly useful way for companies to collect, maintain, and disseminate such complex information is to use a knowledge-based system. Knowledge-based
15 systems, also known as "expert" systems, are typically application programs that make decisions or solve problems in a particular subject area, referred to as a "knowledge domain," by using knowledge and analytical tools defined by experts in the field. By their very nature, expert systems are knowledge-intensive due to the goal of modeling human expertise in a domain. Such systems usually comprise two components: a
20 knowledge base containing the information necessary to answer questions relevant to the domain and an inference engine to formulate answers to these questions, also known as "queries," based on the information contained in the knowledge base. Also, a user interface typically is provided to receive the queries from either a user or another application program, to submit these queries to the inference engine, and then to
25 provide responses back to the user or other application program. Users of such an

expert system may include Human Resource (HR) personnel and individual employees themselves.

Knowledge-based systems have been used in such diverse knowledge domains as engineering, the sciences, medicine, and business. Similar to numerical computer systems, they model situations and solve problems. However, and most importantly, knowledge-based systems also provide representation and reasoning capabilities that are not possible with most numerical methods. One specific example of these additional capabilities concerns the modeling of the knowledge possessed by human resource professionals in institutions such as government agencies or commercial companies.

There are currently many systems used by HR departments to answer employee and managerial questions about employee benefit plans and HR policies, procedures, and practices. These questions address issues such as how to use medical plans, take leaves of absence, and file harassment complaints; as well as other issues such as paycheck withholding amounts, for example.

The information sources used to answer these questions in the typical organization usually reside in various formal and informal repositories. Some sources are static documents, both paper and electronic. These documents, which may or may not have been generated by the HR department, are designed to answer questions posed by employees. Other information sources include dynamic databases, such as the human resource management systems (HRMSs) that contain accounting information for each employee. Finally, some information resides only in the heads of the experienced HR professionals in the organization. These various and unconnected systems are the basis of most companies's HR information dissemination processes today, but there are problems with the underlying model for information dissemination.

First, pre-prepared, static documents are costly to produce. These document types include manually maintained policy manuals, summary plan descriptions, and web sites. Second, these document types tend quickly to become outdated, especially during major system or corporate reorganizations. Also, these resources often are able only to give general answers because more-detailed answers may vary depending on a particular employee's situation, such as employee group, physical location, age, and length of employment.

In contrast, HRMSs, which are sometimes part of even larger enterprise resource planning systems (ERPs), contain vast quantities of accurate, constantly-updated data. These dynamic systems, however, usually do not contain information on HR policies or on how to submit forms, for example. Thus, HRMSs tend to be able to answer questions seeking information from one data source (*e.g.*, what is the net amount on my monthly paycheck), but not questions seeking information from a variety of data sources (*e.g.*, I'm having a baby, what does the company do for me and what must I do to use these benefits).

Other systems, such as electronic collections of answers to questions previously asked by other employees, are easy to search, but require significant resources to prepare and pose the same problems presented by static, prepared documents. These electronic question collection systems are likely to yield incorrect answers as a result of changes in company policies or system organization that would render previously correct answers incorrect. Not only is it tedious and difficult to identify and correct all of the affected answers following a change in company policies or system organization, it is even harder to verify that the changed answers are correct and complete. This is because the answers to such questions do not necessarily reflect the various data that were used to formulate the answers. It quickly becomes apparent that such systems do

not adequately address the deficiencies of other systems or serve as a useful information resource.

Finally, although HR professionals themselves can be used to answer questions, such a resource is both expensive and inefficient. Using HR professionals to constantly answer repetitive questions, instead of performing other, more important aspects of their jobs, is not the best application of their skills and may result in the loss of talented HR professionals from an organization. In addition, finding the appropriate knowledgeable person to answer a question can be a frustrating and slow process for an employee. Furthermore, such resources may not be accessed by other computer applications, the way an electronic system may be. Thus, relying on HR personnel to provide employee information is not a productive option for any but the smallest of organizations.

Consequently, knowledge modeling and delivery systems have evolved that combine pre-configured, parameterized models of human resource knowledge with organization and employee data. Such expert systems have successfully delivered personalized answers to employee and manager questions about benefit plans, payroll, HR policies, procedures, and practices using expert system inferencing techniques.

However, in the advancement of knowledge systems generally, most of the effort has been directed to improving knowledge modeling and inferencing techniques in order to improve system reliability and the value of the information such systems provide to the user. Unfortunately, because of the limited commercial viability of these knowledge modeling and inferencing techniques thus far, insufficient effort has been expended to improve the delivery of information generated by the knowledge system to the user. However, if such knowledge-based systems are ever to be more broadly deployed, issues such as information presentation move to the forefront.

In the past, knowledge-based systems have generally employed one or two means to present the information drawn by the inferencing engine from the knowledge base. Most commonly, presentation of the information is dependent on how the knowledge in the knowledge base is organized. Domain experts inevitably mentally
5 organize their knowledge differently from how various potential users might like to retrieve it. Thus, the domain experts often design and build a knowledge model of a domain that matches their mental organization of the domain, while different users of the model want to see the information contained in the model using alternative organizations. The typical solution—providing general and technical levels of
10 responses—does not adequately meet a particular individual's specific information needs in most situations.

Recently, however, efforts have been focused on separating how the information is displayed from how it is stored in the knowledge base in order to present the same information in a variety of ways. However, problems continue to arise in the manner in
15 which information is presented to the user due to the fact that a given user's needs may vary from the form of presentation based on the nature of the information required.

With reference to the specific example of expert systems that provide information on various plans and the benefits offered by each, it is not uncommon for an HR functional expert to create a presentation, such as a Web site or a manual, that
20 describes each benefit plan. While the information presented seems to be complete and correct to the HR functional expert, when the presentation is referenced by an employee attempting to make a decision regarding in which plan to enroll, it is often very difficult for the user to coordinate and to digest the information. The information may be perceived by the employee as being overly technical and the key features, which the
25 employee requires, may appear to be buried beneath other information that is irrelevant to the employee and/or fragmented into more than one location. Thus, not only is the

employee frustrated by the significant effort required to obtain the correct information, the employee can never determine with certainty that all of the relevant information has been retrieved.

Moreover, other problems arise as a result of differences in the experience levels of the various users that such a system must accommodate. Some users know so little about the subject area that they fail to comprehend a given presentation, whereas other users, who may have had a great deal of experience in the knowledge domain, sometimes experience frustration in finding the "nuts and bolts" facts and details that they require.

Considering the example of an expert system that models the benefits offered by a medical plan, the same manner of presentation cannot be used for an employee, a doctor's office, and a medical plan designer because their respective needs are so disparate. Yet, if multiple presentations are built for all possible users, it is burdensome to keep them all current when changes to the knowledge base occur. Also, when an employee has a life event such as marriage or childbirth, many pieces of information from many plans and policies need to be compiled in order for the employee to determine which plan best suits the new needs and whether an enrollment change is warranted. Consider again the specific example of a company that offers more than one medical benefit plan to its employees. The different medical plans will invariably have different features, such as specific physician participation, referral requirements, services covered, and costs, such as deductible, co-pay, and prescription amounts.

The ideal comparative information distribution system would enable a new employee starting with the company to make an informed enrollment decision on the date of hire or shortly thereafter. The ideal plan would also enable enrolled employees to determine once a year during an open enrollment period if the plan in which they are currently enrolled will continue to best suit their needs in the coming year or whether

they should change their enrollment. In addition, the ideal plan would enable an employee to determine which information is most necessary to make the decision. Finally, the ideal system would provide these features to users while enabling plan administrators to organise the information resources in ways that are most

5 comprehensible to them and are easiest to maintain.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a knowledge-based system that overcomes the deficiencies of currently available information

10 systems.

It is an additional object of the present invention to provide a knowledge-based system having an architecture that separates the presentation of information from its organization in the system in order to provide multiple types of presentations of the same information.

15 It is a further object of the present invention to provide a knowledge-based system in which changes to the knowledge base are automatically reflected in the plan presentations.

It is yet another object of the present invention to provide a knowledge-based system that enables a user to determine the format in which the pertinent information is

20 displayed.

It is a still further object of the present invention to provide a knowledge-based system in which information may be presented in a format best to show the differences between related classes of information, *e.g.*, the costs and benefits of different medical plans.

It is another object of the present invention to provide a means of generating and displaying comparative information derived from related classes of information, *e.g.*, the costs and benefits of different medical plans.

It is yet a further object of the present invention to provide a means of generating
5 and displaying comparative information derived from the same class of information, *e.g.*, the costs and benefits of the same medical plan over different time periods, such as the current year and the following year.

In its most general aspect, the present invention is directed to a comparison table generation and display technique for use with a knowledge-based comparative
10 information dissemination system. The system uses a knowledge model repository, which comprises multiple instantiations of at least one knowledge domain model. For example, in one anticipated implementation, the knowledge domain model is for medical benefit plans offered by employers. The different instantiations correspond to different plans offered by that employer. Moreover, different versions of each
15 instantiation can be used to compare benefits and pricing for different time frames. The table generation and display technique of the present invention enables users to generate a comparison table containing information related to various features, benefits, and costs of different plans in such a way as to most easily compare the plans when making an enrollment decision. In addition, the table generation and display technique
20 of the present invention enables users to generate a comparison table containing information related to the various features, benefits, and costs of the same plan over different time periods in such a way as to determine whether that plan will continue to meet their needs in the future.

The table generation and display technique of the present invention is made
25 possible by means of a compiler, such as a knowledge base engine, that is used to access the knowledge model repository and acquire information from the multiple

instantiations based on the queries and/or parameters established by a user. A display process then combines the acquired information from the multiple instantiations in a tabular format to enable comparative analysis of the information by the user.

In specific embodiments, the knowledge model repository comprises at least one human resource knowledge model. For example, the different instantiations of the knowledge model could comprise different benefit plans, such as medical and retirement benefit plans, or information related to the same plan, but over different time periods, *e.g.*, the current year and the following year. In one implementation, information is contained in knowledge blocks that compose hierarchically-organized knowledge models. Such organization can further comprise major and minor categories of the knowledge blocks.

In one embodiment, the display process presents the acquired information from the multiple instantiations in a table. For example, this table can have a first, horizontal, axis that has headings for the different knowledge model instantiations, such as various medical plans. A second, vertical, axis of the table may provide headings for different knowledge blocks covered by the selected knowledge model instantiations. For example, the vertical axis can present information such as monthly costs, doctors's participation in the plan, prescription coverage, and claim processes for each of the different medical plans presented on the horizontal axis.

Thus, a user can quickly determine the various attributes of certain classes of information, such as specific physician participation, deductible amounts for non-participating physicians, and copay amounts for a selected plan by reading down a column. Similarly, using the same table presentation, a user may quickly compare the differences between plans for the same class of information, such as copay amounts, by reading across a row.

Preferably, the table may be dynamically updated based on a user's preferences. For example, pull-down menus may be used to select among the different instantiations and selecting a new instantiation would automatically update the cells related to that new instantiation.

5 The above and other features of the invention, including various novel details of construction, combinations of functions, and other advantages, will now be more particularly described with reference to the accompanying drawings and pointed out in the claims. It will be understood that the particular method and system embodying the invention are shown by way of illustration and not as a limitation of the invention. The
10 principles and features of this invention may be employed in various and numerous embodiments without departing from the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

15 In the drawings, like reference characters refer to the same components throughout the different views. The drawings do not necessarily present every component of the system, emphasis instead being placed upon illustrating the principles of the invention. Of the drawings:

Fig. 1 shows a block diagram showing the organization of a knowledge-based information system according to the present invention;

20 Fig. 2 is a schematic representation of a web page or HTML presentation showing the organization of a dynamically generated comparison table generated by a user of a knowledge-based information system according to the present invention;

Fig. 3 illustrates a portion of a knowledge model from which the comparison table draws information;

25 Fig. 4 shows a portion of the information repository that holds the variable assignments for each of the various instantiations of the knowledge model of Fig. 3; and

Fig. 5A shows a partial schematic of the interactivities of the knowledge model repository, instance repository, and runtime environment of the knowledge-based information system according to the present invention.

Fig. 5B shows a partial exemplary schematic of the interactivities of the knowledge model repository, instance repository, and runtime environment of the knowledge-based information system according to the present invention implemented in the employee benefit context.

DETAILED DESCRIPTION OF THE INVENTION

Turning now to the drawings, Fig. 2 shows a web page or HTML presentation showing the organization of a dynamically generated comparison table that has been constructed according to the principles of the present invention. While the following discussion is specific to a system that provides human resource-related information, such as medical plan, dental plan, and optional insurance plan benefits, as is common with many expert systems, the principles of the present invention have wider applicability to such diverse fields as financial systems, enterprise management systems, supply-chain systems, insurance systems, corporate sales, manufacturing processes, and technical systems, to list a few examples.

In a preferred embodiment, illustrated in Fig. 1, information is sent to the entity making the query using a combination of a conventional browser 106 and a conventional web server 107. In such an example, the server 107 and browser 106 communicate via a TCP/IP network 109. Such a system has certain advantages in that established platforms and tools are readily available. In other implementations, however, proprietary interfaces could be used over public and/or private networks. Moreover, in still other implementations, the knowledge system may provide information to another application program, such as other human resource or

enterprise management systems, that has its own proprietary interfaces and displays. In such situations, the knowledge engine interfaces with the other application program via, in one case, standard application programming interfaces (APIs).

In the present embodiment, the querying entity may be an employee seeking to answer personal questions concerning, *e.g.*, his benefits or a manager seeking to answer such questions concerning the employees in her department. Alternatively, this system may also be deployed to enable HR professionals to generate queries and obtain answers in response to questions from employees seeking the information, *e.g.*, in a call-center environment. In still other applications, the system may be invoked during a plan selection process by an employee to provide information to assist the employee with the plan selection decision.

A knowledge engine or compiler 108 dynamically generates the HTML (Hyper-Text Markup Language) pages that are provided by the web server 107. These web pages are generated by referencing the relevant section of the knowledge model repository 101 and inserting information from the organization-specific and group-specific information repository 103 and HRMS 105 that functions as the employee-specific information repository.

In one embodiment, the compiled information from the knowledge model repository 101, organization-specific information repository 103, and the HRMS 105 is then incorporated into HTML template pages contained in a presentation repository 114. The resulting complete pages are provided by the web server 107 to browser 106. In other embodiments, the responses are interfaced with other applications and/or processes rather than directly with users. *E.g.*, information can be transferred to a case-management or claims-processing system.

The knowledge model repository 101 contains the various knowledge models created using knowledge modeling software application 102. In one embodiment, these

models are implemented either in an object-oriented or relational database system. Knowledge model repository 101 typically contains separate knowledge models for multiple plans, such as benefit plans for both hourly-workers and for salaried workers. The model for each of these plans, however, may be hierarchically-organized.

5 The knowledge modeling software application 102 is a tool that is used to generate the knowledge models contained in knowledge model repository 101. This system tracks variable assignments and their location in the organizational and HRMS repositories. It also provides template rule organization tools for building the sequenced data entry screens that are used during system implementation for creating
10 variable assignments.

 The organizational information collection software application 104 is a tool used by an HR system manager to accumulate information specific to the organization in the organization-specific information repository 103. In one embodiment, this
15 organizational information collection software application 104 successively prompts the system manager to enter the information required by the system. The serial questions posed by the prompts are generated by accessing the associated variable prompts that are stored in the knowledge model repository 101. This process creates the various instantiations of the knowledge models, such as models of the specific medical plans covered by the system.

20 In the example presentation of Fig. 2, information is provided to a user who is selecting or changing a health insurance plan. Specifically, the presentation provides answers concerning a user-defined selection of benefits offered next year by both the HMO Blue and Scrimshaw Catastrophic Medical plans, as compared to the user's current benefits under HMO Blue. The user may tailor the presentation in order to
25 compare only those benefits that are of concern to the user.

Comparison table 200 shows information concerning different medical plans that has been generated by knowledge base engine 108 and supplied by server 107 to the user via web browser 106. A first, horizontal, axis 210 has headings 212A-212C corresponding to various aspects of the user's context, *e.g.*, group instantiations, plan instantiations, or effective date instantiations. Specifically, the context relates both to plan instantiations (*viz.*, the HMO Blue plan and the Scrimshaw Catastrophic Medical plan) and effective date instantiations (*viz.*, this year and next year). In the preferred embodiment, the user may define the context by selecting the relevant knowledge model instantiation(s), preferably by selection from a menu of possible instantiations via pull down menus (accessed by activation points 218) in the headings. These pull down menus list several, or preferably most, or most preferably all of the different instantiations of the knowledge model.

The second, vertical, axis 214 has headings for selected knowledge blocks 216A-216G covered by the knowledge model instantiation(s) selected. Preferably, these knowledge blocks are individually selected from a menu of possible knowledge blocks via pull down menus 220. For each cell, the compiler interprets the knowledge block specified by the row using the context including the knowledge model instantiation specified by column. *E.g.*, cells 222A and 222B of table 200 display specific information concerning the relevant knowledge block for each instantiation selected. Cell 222A relates to submitting claims under the current HMO Blue medical plan and cell 222B relates to submitting claims under next year's HMO Blue medical plan.

As illustrated by the exemplary presentation of Fig. 2, each comparison table is generated based on user-selected plans and plan features. The table presentation may be revised dynamically by the user in response to changes made to the plan and plan feature selections.

Fig. 3 shows exemplary knowledge blocks of which the knowledge model is composed. In the present implementation of the knowledge model, rules and text inferencing mechanisms are used to construct the cells in the plan comparison table by the knowledge engine. The example illustrates the Medical Plan Feature Overview knowledge block, which has a block ID of OVERVIEW, and the claim submission knowledge block. In this specific example, text is generated by the interpretive logic, through "if-then-else" statements, and also through strict substitution, where variables are located and replaced with variable assignments drawn from information repository 103. It is important to note the separation between the presentation format and the organization of the knowledge blocks in the knowledge model. Because the model organization is divorced from the display format, the system is able to best serve both the needs of the domain expert who designs the system and the user that relies on it to obtain specific information.

Fig. 4 shows an exemplary information repository 103. Specifically, variable assignments are made according to a querying employee's employee-specific information, employer information, plan, employee group, and effective date. Thus, there are different instantiations of the policy depending on the employee's employee-specific information, employer information, plan, employee group, and effective date. Thus, plan- and date-specific information is inserted into the knowledge blocks, and therefore the table presentation, to provide comparative analysis displays in a user-friendly fashion without artifacts from the knowledge-model's organization. Variable assignments may also be drawn from information contained in the company's HRMS.

In addition to presenting the information in a fashion that is useful to a given system user, all various possible presentations are updated automatically when changes are made to the underlying knowledge model and information repository. Fig. 4 illustrates the effect that changes to the effective date have on the same instantiation

(i.e., HMO Blue) and also the effect of changes in the instantiation (i.e., HMO Blue and Scrimshaw). Specifically, the current HMO Blue plan requires a \$15 coinsurance payment per visit, in contrast to a \$20 coinsurance payment per visit next year and a 20% unlimited dollar amount under the Scrimshaw plan.

5 Fig. 5A illustrates an exemplary portion of the interactivities of the constituent elements of the knowledge model repository, instance repository, and the runtime environment of a user. Fig. 5 B illustrates the same exemplary portion of the interactivities of the constituent elements of the knowledge model repository, instance repository, and the runtime environment of a user, as shown in Fig. 5A, as it might
10 occur in the employee benefit context.

 It is important to note the possible differences between the comparison table structure and the knowledge block organisation structure in the knowledge model. E.g., the table shown in Fig. 2 could present different information related to the same medical benefit plans in response to user-initiated changes in plan and plan feature
15 selections. Despite the different presentation options available to a system user, the plan comparison table references the same knowledge blocks in the knowledge model. In this way, the presentation may be organized for the user's ease of access, while the knowledge model may be organized for content authoring by a domain expert.

 While this invention has been particularly shown and described with references
20 to specific embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

CLAIMS

What is claimed is:

1. A knowledge-based comparative information dissemination system, comprising:
 - at least one knowledge model constructed using at least one knowledge block;
 - at least two instantiations of said at least one knowledge model;
 - compiler means capable of accessing the at least one knowledge model and the at least two instantiations of said at least one knowledge model to acquire information necessary to answer a query from a system user with a defined context, said query being related to said at least two instantiations and said compiler means being further capable of combining the information so that it may be displayed to said system user; and
 - display means capable of presenting the combined information to said system user in a format designed to facilitate comparative analysis by said system user.
2. The knowledge-based system as described in Claim 1, wherein the at least one knowledge model is organized as determined by a content author.
3. The knowledge-based system as described in Claim 1, wherein the at least one knowledge model is a human resource knowledge model.
4. The knowledge-based system as described in Claim 1, wherein the at least one knowledge model resides within a knowledge model repository.
5. The knowledge-based system as described in Claim 4, wherein the knowledge model repository comprises at least one human resource knowledge model.

6. The knowledge-based system as described in Claim 5, wherein the at least two instantiations relate to different benefit plans in the at least one human resource knowledge model.

7. The knowledge-based system as described in Claim 1, wherein the at least two instantiations of said at least one knowledge model reside within an information repository.

8. The knowledge-based system as described in Claim 1, wherein the compiler means is capable of accessing the knowledge model repository.

9. The knowledge-based system as described in Claim 1, wherein the compiler means is capable of accessing the information repository.

10. The knowledge-based system as described in Claim 1, wherein said at least one knowledge block is hierarchically organized within said at least one knowledge model.

11. The knowledge-based system as described in Claim 1, wherein the at least one knowledge block comprises rules, text, and variable references.

12. The knowledge-based system as described in Claim 11, wherein the compiler interprets, in view of the user's defined context, the rules, text, and variables contained in said at least one knowledge block.

13. The knowledge-based system as described in Claim 12, wherein the user's defined context consists of elements selected from the group consisting of user-defined employee instantiations, employee group instantiations, employer instantiations, plan instantiations, and effective date.

14. The knowledge-based system as described in Claim 3, wherein the at least one knowledge block comprises rules, text, and variable references.

15. The knowledge-based system as described in Claim 14, wherein the compiler interprets, in view of the user's defined context, the rules, text, and variables contained in said at least one knowledge block.

16. The knowledge-based system as described in Claim 15, wherein the user's defined context consists of elements selected from the group consisting of user-defined employee instantiations, employee group instantiations, employer instantiations, plan instantiations, and effective date.

17. The knowledge-based system as described in Claim 1, wherein said at least one knowledge block is organized by major categories and minor categories within said at least one knowledge model.

18. The knowledge-based system as described in Claim 17, wherein the at least one knowledge block comprises rules, text, and variable references.

19. The knowledge-based system as described in Claim 18, wherein the compiler interprets, in view of the user's defined context, the rules, text, and variables contained in said at least one knowledge block.

20. The knowledge-based system as described in Claim 19, wherein the user's defined context is determined by factors selected from the group consisting of user-defined employee instantiations, employee group instantiations, employer instantiations, plan instantiations, and effective date.

21. The knowledge-based system as described in Claim 1, wherein the combined information is displayed within at least one presentation template.

22. The knowledge-based system as described in Claim 21, wherein the at least one presentation template is formatted in a markup language derived from SGML.

23. The knowledge-based system as described in Claim 22, wherein the markup language is selected from the group consisting of HTML and XML.

24. The knowledge-based system as described in Claim 1, wherein the display process presents the acquired information in a table.

25. The knowledge-based system as described in Claim 24, wherein the table comprises a plurality of cells formed by a first axis providing a plurality of headings, each for selecting one of the at least two instantiations of the at least one knowledge model and a second axis providing at least one heading for selecting the at least one knowledge block comprised by the at least two instantiations of the knowledge model.

26. The knowledge-based system as described in Claim 25, wherein the second axis comprises a plurality of headings.

27. The knowledge-based system as described in Claim 26, wherein a user may select for each heading on the second axis from among a plurality of knowledge blocks comprised by the at least two instantiations of the knowledge model.

28. The knowledge-based system as described in Claim 25, wherein each cell presents information related to each knowledge block relative to the selected instantiation of the knowledge model.

29. The knowledge-based system as described in Claim 25, wherein the headings of the first axis comprise pull-down menus facilitating the selection of one of the different instantiations.

30. The knowledge-based system as described in Claim 27, wherein the headings of the second axis comprise pull-down menus facilitating the selection among at least two of the different knowledge blocks comprised by the different instantiations of the knowledge models.

31. The knowledge-based system as described in Claim 29, wherein cells under a heading of the first axis are updated with knowledge block information in response to selection of a different knowledge model instantiation.

32. The knowledge-based system as described in Claim 30, wherein cells under heading of the second axis are updated with information from the selected knowledge model instantiations in response to selection of a different knowledge block comprised by the different instantiations of the knowledge models.

33. The knowledge-based system as described in Claim 24, wherein the table comprises a first axis providing a plurality of headings, each for selecting among the different instantiations of the knowledge model and different versions of each instantiation.

34. The knowledge-based system as described in Claim 33, wherein the different versions of each instantiation correspond to different time frames for the validity of the information contained in the knowledge blocks.

35. The knowledge-based system as described in Claim 1, wherein the at least one knowledge block references at least one variable, the value of said at least one variable being determined by the compiler means based on variable assignments within an information repository and the user's defined context.

36. The knowledge-based system as described in Claim 35, wherein the appropriate value for said at least one variable is a nullity.

37. The knowledge-based system as described in Claim 35, wherein the user's defined context consists of elements selected from the group consisting of user-defined employee instantiations, employee group instantiations, employer instantiations, plan instantiations, and effective date.

38. The knowledge-based system as described in Claim 37, wherein the user's defined context in which said at least one variable is referenced determines the instantiation relevant to said at least one variable, said relevant instantiation being used to determine the correct variable assignment for said at least one variable and said correct variable assignment being used to determine the appropriate value for said at least one variable.

39. The knowledge-based system as described in Claim 38, wherein the variable assignments are created using attributes selected from the group consisting of employee instantiations, employee group instantiations, employer instantiations, plan instantiations, and effective date.

40. The knowledge-based system as described in Claim 1, further comprising an information server that receives user queries via a user-operated browser and that transfers to the browser the presentations generated by the compiler.

41. The knowledge-based system as described in Claim 1, further comprising an information server that is accessed by another application program and that transfers to users the presentations generated by the compiler in a manner selected from the group consisting of direct and indirect transmission.

42. A knowledge-based comparative information dissemination system designed to provide, to a user having a defined context, specific information based on the user's defined context, the system comprising:

at least one knowledge model constructed using at least one knowledge block that contains at least one reference to at least one variable;

at least one value assigned to the at least one variable;

at least one variable assignment attribute sufficient to determine the appropriate value for said at least one variable;

at least one presentation template organized in a format designed to best convey information to system users operating in different contexts, in which different presentations are capable of incorporating the same knowledge blocks; and

compiler means that delivers presentations to a system user by combining a presentation template with content supplied by the knowledge model and variable attributes from the information repository.

43. The knowledge-based system as described in Claim 42, wherein the appropriate value for said at least one variable is a nullity.

44. The knowledge-based system as described in Claim 42, wherein the at least one knowledge model is a human resource knowledge model.

45. The knowledge-based system as described in Claim 44, wherein the user's defined context consists of elements selected from the group consisting of user-defined employee instantiations, employee group instantiations, employer instantiations, plan instantiations, and effective date.

46. The knowledge-based system as described in Claim 45, wherein the user's defined context in which said at least one variable is referenced determines the instantiation relevant to said at least one variable, said relevant instantiation being used to determine the correct variable assignment for said at least one variable and said correct variable assignment being used to determine the appropriate value for said at least one variable.

47. The knowledge-based system as described in Claim 46, wherein the variable assignments are created using attributes selected from the group consisting of employee instantiations, employee group instantiations, employer instantiations, plan instantiations, and effective date.

48. The knowledge-based system as described in Claim 42, wherein the at least one knowledge block is organized by a content author.

49. The knowledge-based system as described in Claim 42, wherein the at least two values assigned to the at least one variable reside within an information repository.

50. The knowledge-based system as described in Claim 42, wherein the at least one presentation template reside within a presentation template repository.

51. The knowledge-based system as described in Claim 42, wherein the at least one knowledge block is hierarchically organized within the at least one knowledge model.

52. The knowledge-based system as described in Claim 42, wherein the at least one knowledge block is organized by major categories and minor categories within the at least one knowledge model.

53. The knowledge-based system as described in Claim 42, wherein the at least one knowledge block further comprises rules and text.

54. The knowledge-based system as described in Claim 53, wherein the compiler interprets, in view of the user's defined context, the rules, text, and variable references contained in said at least one knowledge block.

55. The knowledge-based system as described in Claim 54, wherein the user's defined context is determined by factors selected from the group consisting of user-defined employee instantiations, employee group instantiations, employer instantiations, plan instantiations, and effective date.

56. The knowledge-based system as described in Claim 42, wherein the value of said at least one variable is determined by the compiler based on variable assignments within an information repository and the user's defined context.

57. The knowledge-based system as described in Claim 56, wherein the user's defined context determines the instantiation relevant to said at least one variable, which in turn defines a value for said at least one variable.

58. The knowledge-based system as described in Claim 57, wherein the variable assignments are created using attributes selected from the group consisting of employee instantiations, employee group instantiations, employer instantiations, plan instantiations, and effective date.

59. The knowledge-based system as described in Claim 42, wherein the display process presents the acquired information in a table.

60. The knowledge-based system as described in Claim 59, wherein the table comprises a plurality of cells formed by a first axis providing a plurality of headings, each for selecting one of the at least two instantiations of the at least one knowledge model and a second axis providing at least one heading for selecting the at least one knowledge block comprised by the at least two instantiations of the knowledge model.

61. The knowledge-based system as described in Claim 60, wherein the second axis comprises a plurality of headings.

62. The knowledge-based system as described in Claim 61, wherein a user may select for each heading on the second axis from among a plurality of knowledge blocks comprised by the at least two instantiations of the knowledge model.

63. The knowledge-based system as described in Claim 60, wherein each cell presents information related to each knowledge block relative to the selected instantiation of the knowledge model.

64. The knowledge-based system as described in Claim 60, wherein the headings of the first axis comprise pull-down menus facilitating the selection of one of the different instantiations.

65. The knowledge-based system as described in Claim 62, wherein the headings of the second axis comprise pull-down menus facilitating the selection among at least two of the different knowledge blocks comprised by the different instantiations of the knowledge models.

66. The knowledge-based system as described in Claim 64, wherein cells under a heading of the first axis are updated with knowledge block information in response to selection of a different knowledge model instantiation.

67. The knowledge-based system as described in Claim 65, wherein cells under heading of the second axis are updated with information from the selected knowledge model instantiations in response to selection of a different knowledge block comprised by the different instantiations of the knowledge models.

68. The knowledge-based system as described in Claim 59, wherein the table comprises a first axis providing a plurality of headings, each for selecting among the different instantiations of the knowledge model and different versions of each instantiation.

69. The knowledge-based system as described in Claim 42, wherein the at least one presentation template is formatted in a markup language derived from SGML.

70. The knowledge-based system as described in Claim 69, wherein the markup language is selected from the group consisting of HTML and XML.

71. The knowledge-based system as described in Claim 42, further comprising an information server that receives user queries via a user-operated browser and that transfers to the browser the presentations generated by the compiler.

72. The knowledge-based system as described in Claim 42, further comprising an information server that is accessed by another application program and that transfers to users the presentations generated by the compiler in a manner selected from the group consisting of direct and indirect transmission.

73. A method of providing information, the method comprising the steps of:
accessing a presentation template that references at least one knowledge
block;

incorporating information into the presentation template by means of a
compiler based on the contents of the at least one knowledge block referenced by the
presentation template; and

displaying a presentation to a user comprising the presentation template
and the incorporated information in a format designed to facilitate comparative
analysis.

74. The method as described in Claim 73 wherein the format is a comparison
table.

75. The method as described in Claim 73 wherein the presentation template is
accessed in response to a user query.

76. The method as described in Claim 73, wherein the information is derived
based on the interpretation by the compiler of the at least one knowledge block.

77. The method as described in Claim 73, wherein the compiler interprets in
view of the context in which a user is operating rules, text, and at least one variable
contained in said at least one knowledge block.

78. The method as described in Claim 77, wherein the presentation contains
human resource-related information and the value associated with the at least one
variable is determined by the compiler after the user context is determined.

80. The method as described in Claim 73, further comprising hierarchically organizing the content in the at least one knowledge block within the knowledge model.

80. The method as described in Claim 73, further comprising hierarchically organizing the content in the at least one knowledge block within the knowledge model.

81. A method of answering a query about an information system user, the method comprising the steps of:

a) accessing an information system that comprises:
at least one knowledge model constructed using at least one knowledge block;

at least two instantiations of said at least one knowledge model;
compiler means capable of accessing the at least one knowledge model and the at least two instantiations of said at least one knowledge model to acquire information necessary to answer a query from a system user with a defined context, said query being related to said at least two instantiations and said compiler means being further capable of combining the information with a presentation page so that it may be displayed to said system user; and

display means capable of presenting the combined information to said system user in a format designed to facilitate comparative analysis by said system user;

b) identifying said system user,
c) identifying the presentation page appropriate to answer the query;
d) determining the relevant at least two instantiations of said at least one knowledge model;

e) selecting the relevant at least two instantiations in a presentation template;

f) inserting relevant employee information into the at least one knowledge block by reference to an information repository to derive information enabling the query to be answered; and

g) displaying the derived information in a comparative table.

82. The method as claimed in claim 81, wherein the relevant employee information comprises information from a HRMS.

83. The method as claimed in claim 81, wherein the relevant employee information comprises employee -specific information, employee group-specific information, employer-specific information, benefit plan-specific information, and effective date information.

84. The method as claimed in claim 81, wherein the presentation page is identified by navigation.

85. The method as claimed in claim 81, wherein the presentation page is identified by a search engine.

COMPARISON TABLE GENERATION AND DISPLAY FROM INSTANTIATIONS OF KNOWLEDGE MODEL

ABSTRACT OF THE DISCLOSURE

A comparison table generation and display technique for use with a knowledge-based comparative information dissemination system is provided. The technique enables system users to generate a comparison table containing information related to the knowledge domain to which the system is directed in such a way as to most easily compare the differences between various aspects of the domain. In addition, the technique enables users to generate a comparison table containing information related to the same aspects of the domain over different time periods.

Figure 1

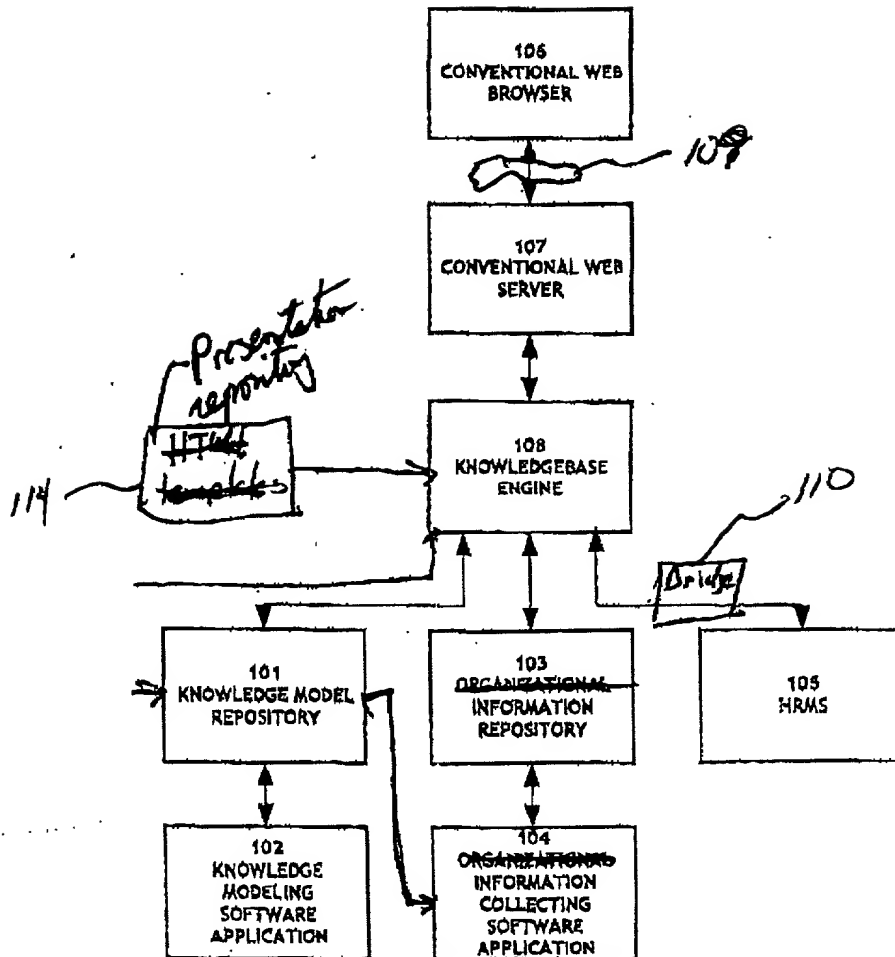


Figure 2

Comparing Medical Plans - Microsoft Internet Explorer

File Edit View Go Favorites Help

Comparing Medical Plans for Next Year

Company Home Search Human Resources Personal

In the first row, choose the plans you want to compare. Then select the plan features in the first column.

	Your current plan - HMO Blue	HMO Blue, next year's features	Scrimshaw Catastrophic Medical
Overview	This is an HMO. Under this plan you choose a primary care physician who will manage your care and refer you to specialists in the network. Most covered expenses are paid at \$15. Except in an emergency, you do not receive benefits if you received care outside of the network.	This is an HMO. Under this plan you choose a primary care physician who will manage your care and refer you to specialists in the network. Most covered expenses are paid at \$20. Except in an emergency, you do not receive benefits if you received care outside of the network.	This is an indemnity plan. Under this plan, most expenses are paid at 80% after you have met the annual deductible of \$200.
Monthly cost	\$150 for individual coverage, pre-tax \$215 for family coverage, pre-tax	\$158 for individual coverage, pre-tax \$227 for family coverage, pre-tax	\$123 for individual coverage, pre-tax \$194 for family coverage, pre-tax
Doctors	You choose a primary care physician from a provider directory list. Your primary care physician must refer you to other doctors.	You choose a primary care physician from a provider directory list. Your primary care physician must refer you to other doctors.	You can use any doctor or specialist you wish.
Office visits	All office visits to your primary care physician or any specialist cost \$15. You pay the doctor at the time of your visit.	All office visits to your primary care physician or any specialist cost \$20. You pay the doctor at the time of your visit.	You pay the doctor the full amount for care given. Then you fill out a claim form and send it in for reimbursement of up to 80%.
Prescriptions	All brand name drugs cost \$15, generics \$10.	All brand name drugs cost \$20, generics \$10. There is a monthly limit on certain drugs.	You pay the full cost of the drugs, then submit a claim for for up to 80% reimbursement.
Claims	This is a Health Maintenance Organization (HMO) so payments are made to your provider directly.	This is a Health Maintenance Organization (HMO) so payments are made to your provider directly.	You can obtain a claim form from the HR department. Read and follow the instructions. Be sure to file a separate claim form for each member of your family and indicate if you want the payment to go to the provider or you. Make copies of all itemized bills, and attach copies to the claim form. Mail the completed claim form to the address on the form.
Hospital	All hospital costs covered at 100% after a \$150 copay. All non-emergency procedures must be pre-approved. If you stay overnight, a semi-private room is covered.	All hospital costs covered at 100% after a \$150 copay. All non-emergency procedures must be pre-approved. If you stay overnight, a semi-private room is covered.	Hospital costs are covered at 80%. If your portion of these expenses exceeds \$1,000 in a calendar year, additional costs are then covered at 100%.

Mr. Computer

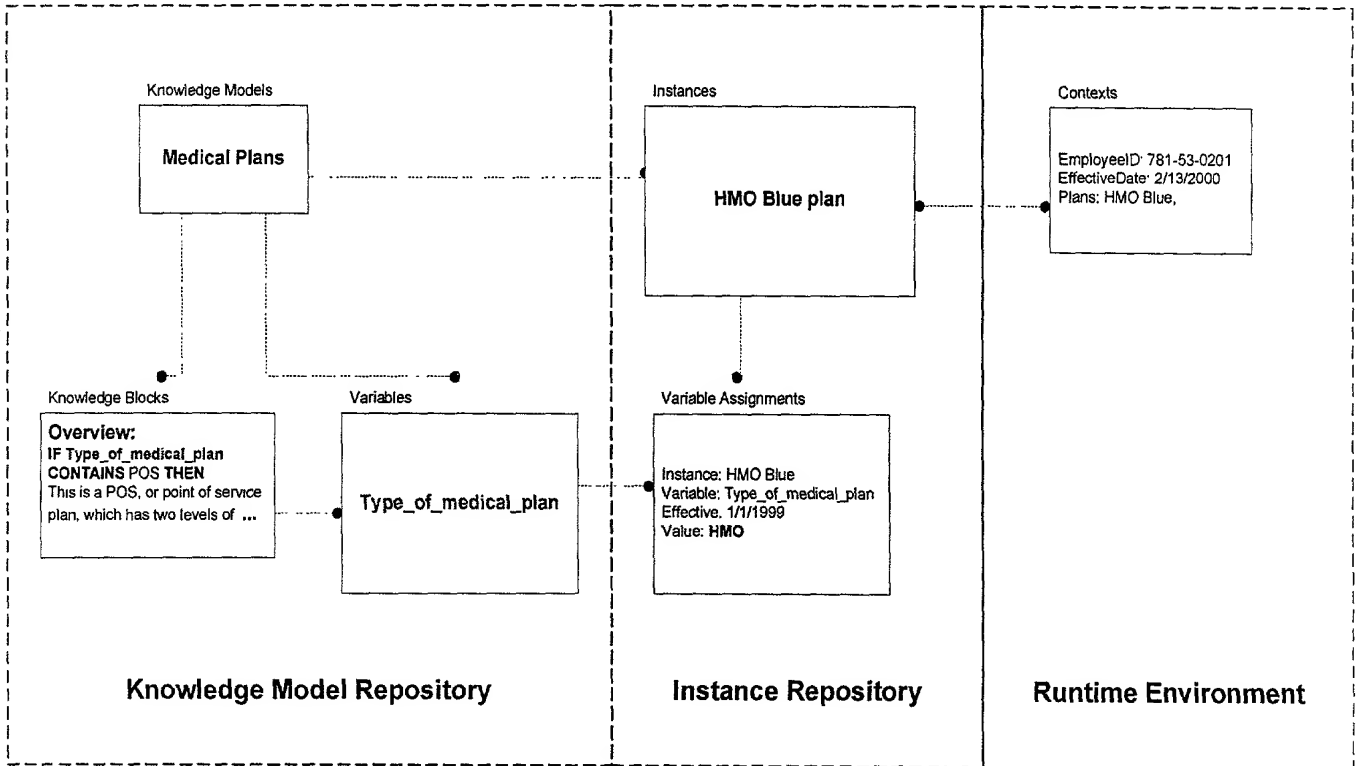
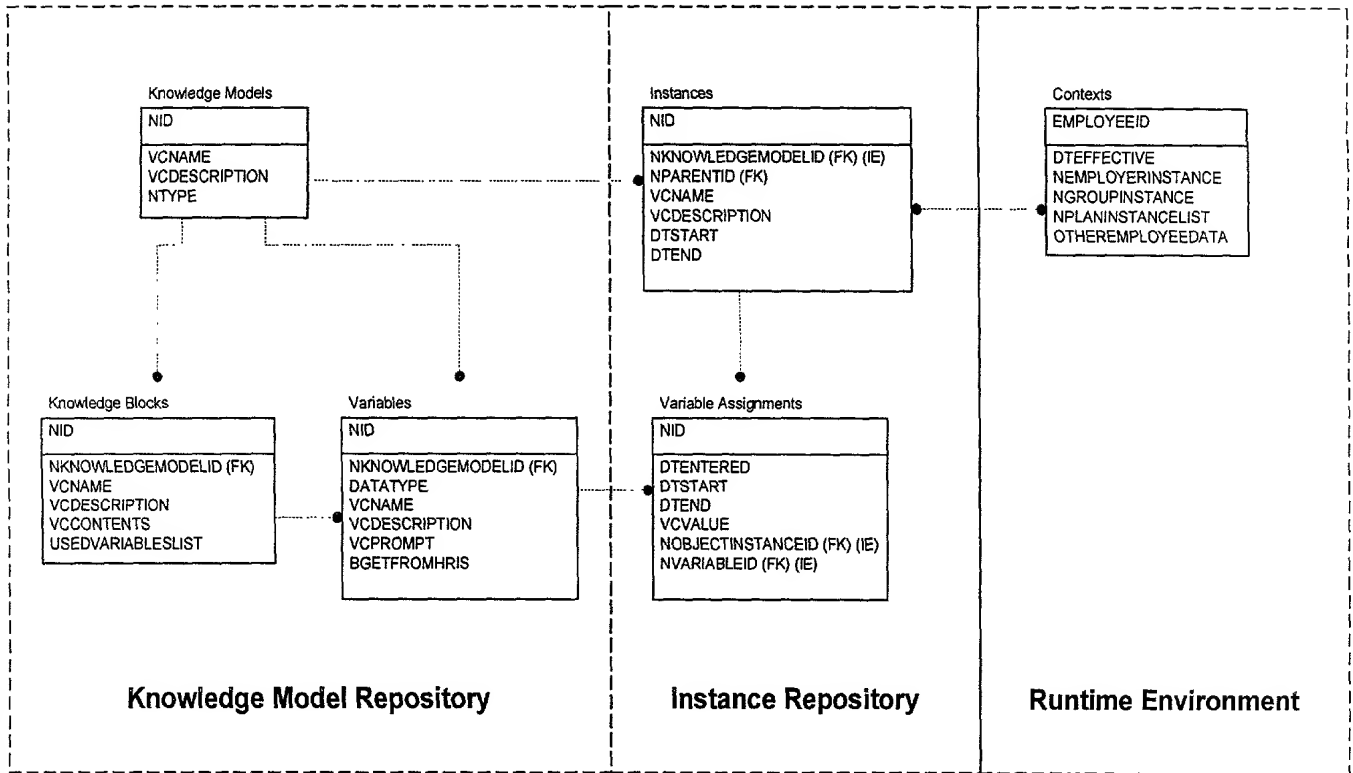
Figure 3

Medical knowledge block name	Medical knowledge block contents
Overview	<p>IF Type_of_medical_plan CONTAINS POS THEN This is a POS, or point of service plan, which has two levels of coverage:</p> <p>This plan pays higher benefits when you receive care from your Primary_care_physician_name and when your Primary_care_physician_name refers you to a hospital or JUMP specialist >> MED11A05 ENDJUMP in the network.</p> <p>This plan pays lower benefits when you receive care outside the network or when you receive treatment that is not arranged by your Primary_care_physician_name.</p> <p>ELSEIF Type_of_medical_plan CONTAINS PPO THEN This is a PPO, or preferred provider organization plan, which has two levels of coverage:</p> <p>This plan pays higher benefits when you receive care from a doctor or hospital in the network. You do not need a referral to see a JUMP specialist >> MED11A05 ENDJUMP to get the higher level of benefits as long as the specialist is in the network.</p> <p>This plan pays a lower benefit level when you receive care outside the network of providers.</p> <p>ELSEIF Type_of_medical_plan CONTAINS Indemnity THEN This is an indemnity plan. Under this plan, most expenses are paid at Coinurance_amount_for_medical MED01B03C Indemnity deductible MED01B03B Indemnity copays</p> <p>ELSEIF Type_of_medical_plan CONTAINS HMO THEN This is an HMO. Under this plan you choose a Primary_care_physician_name who will manage your care and refer you to specialists in the network. Most covered expenses are paid at Coinurance_amount_for_medical. Except in an emergency, you do not receive benefits if you received care outside of the network.</p> <p>ENDIF</p>
Claims	<p>IF Type_of_medical_plan CONTAINS Indemnity THEN You can obtain a claim form from Claim_form_provider_for_medical. Read and follow the instructions. Be sure to file a separate claim form for each member of your family and indicate if you want the payment to go to the provider or you. Make copies of all itemized bills, and attach copies to the claim form. Mail the completed claim form to the address on the form.</p> <p>ELSEIF Type_of_medical_plan CONTAINS POS OR CONTAINS PPO THEN You do not need to submit a claim form for service provided in-network. Payment will be sent directly to your provider.</p> <p>ENDIF</p> <p>IF Type_of_medical_plan CONTAINS POS OR CONTAINS PPO AND Claims_out_of_network_expense_for_medical DOES NOT CONTAIN not covered THEN If you go to an out-of-network provider you need to Claims_filing_out_of_network_expense_for_medical to JUMP Claims_administrator_medical_plan. >> MED_contact ENDJUMP Be sure to file a separate claim for each member of your family. Make copies of all itemized bills. You will also need to indicate whether you want the payment to go to the provider or to you.</p> <p>ENDIF</p> <p>IF Type_of_medical_plan CONTAINS HMO THEN This is a Health Maintenance Organization (HMO) so payments are made to your provider directly.</p> <p>ENDIF</p>

Figure 4

Variable	Plan/Policy	Employee Group	Effective Date	Value
Type_of_medical_plan	HMO Blue	ALL	1/1/99	HMO
Type_of_medical_plan	Scrimshaw Catastrophic	ALL	1/1/99	Indemnity
Primary_care_physician_name	HMO Blue	ALL	1/1/99	Primary care physician
Coinsurance_amount_for_medical	HMO Blue	ALL	1/1/99	\$15
			1/1/2000	\$20
Coinsurance_amount_for_medical	Scrimshaw Catastrophic	ALL	1/1/99	80%
Claim_form_provider_for_medical	Scrimshaw Catastrophic	ALL	1/1/99	HR deparment
Claims_administrator_medical_plan	Scrimshaw Catastrophic	ALL	1/1/99	Indemnity Underwriters, Inc.

Figure 5



Please type a plus sign (+) inside this box → ☐

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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63) <input checked="" type="checkbox"/> Declaration Submitted with Initial Filing OR <input type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)	Attorney Docket Number	AUTP03/9914-2
	First Named Inventor	FARLOW
	COMPLETE IF KNOWN	
	Application Number	/
	Filing Date	11 February 2000
	Group Art Unit	
	Examiner Name	

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

COMPARISON TABLE GENERATION AND DISPLAY FROM INSTANTIATIONS
OF KNOWLEDGE MODEL.

the specification of which

(Title of the Invention)

☒ is attached hereto
OR

☐ was filed on (MM/DD/YYYY) as United States Application Number or PCT International

Application Number and was amended on (MM/DD/YYYY) (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
			<input type="checkbox"/>	YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	
		<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

[Page 1 of 2]

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DECLARATION — Utility or Design Patent Application

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)

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As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

<input type="checkbox"/> Customer Number	<input type="checkbox"/> Registered practitioner(s) name/registration number listed below
OR	

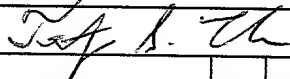
Name	Registration Number	Name	Registration Number
Timothy J. Shea II	37,504		

☐ Additional registered practitioner(s) named on supplemental Registered Practitioner Information sheet PTO/SB/02C attached hereto.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor:		<input type="checkbox"/> A petition has been filed for this unsigned inventor			
Given Name (first and middle (if any))		Family Name or Surname			
Timothy S.		Farlow			
Inventor's Signature				Date	2/1/00
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Post Office Address					
City	Needham	State	MA	ZIP	02449
		Country	US		

☐ Additional inventors are being named on the supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto